SOFTWARE ENGINEERING

DOCTOR OF PHILOSOPHY

PROGRAM HANDBOOK

March 2002

U.S. NAVAL POSTGRADUATE SCHOOL

Monterey, California

PH.D. HANDBOOK CONTENTS

PROGRAM OBJECTIVE

The Ph.D. program in Software Engineering is specifically designed for DoD software practitioners who want to acquire the skill and knowledge to perform state-of-the art research on issues related to the development and evolution of large complex software systems, and to intelligently manage the research of other software practitioners. It offers the software professionals a unique program of study and advances software engineering principles and technology vital to DoD researchers and program managers. Delivery will be by distance learning as well as on campus.

There are institutional rules on all the Ph.D. programs at the Naval Postgraduate School (see Academic Council Policy Manual, Section 5.4). The rules described here supplement, but do not supplant, the institutional rules.

From the Academic Council Policy Manual (as of September 1999)

The degree Doctor of Philosophy is awarded as a result of meritorious and scholarly achievements in a particular field of study that has been approved by the Academic Council as within the purview of the Naval Postgraduate School. A candidate must exhibit faithful and scholarly application to all prescribed courses of study, achieve a high level of achievement, and establish an ability for original investigation leading to the advancement of fundamental knowledge.

Any program leading to the degree Doctor of Philosophy requires the equivalent of at least three academic years of study beyond the baccalaureate level, with at least one academic year[†] (or its equivalent) being spent in residence at the Naval Postgraduate School.

PH.D. COMMITTEE MEMBERS

Dr. Valdis Berzins (Program Chairman)
Dr. Luqi
Dr. Norman Schneidewind
Dr. Geoffrey Xie
Dr. John Osmundson
Dr. Man-Tak Shing
Dr. James Bret Michael

Contact: Dave Floodeen
Software Engineering
Naval Postgraduate School
833 Dyer Road (Spanagel Hall), Rm. 527B
Monterey, CA 93943
Tel: (831) 656-2180/ DSN: 878-2180
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[†] An equivalent distance learning residency requirement has been established by the Software Engineering Group as approved by the Academic Council on 26 June 1999.

† Equivalent Software Engineering Distance Learning Residency Requirement
(as of June 1999)

Distance learning students can satisfy residency requirements by:
(1) Take a minimum of three graduate level Software Engineering seminars (approx. 20-40 hours of study time per week) either on campus or via distance learning;
(2) Register for a minimum of 8 units of thesis research each quarter when not taking NPS distance learning courses;
(3) Participate in a two-week on-campus orientation and intensive study retreat prior to taking the written qualifying examination;
(4) Conduct a two-week on-campus directed study prior to taking the oral qualifying examination;
(5) After advancement to candidacy, spend the equivalent of at least one week each quarter on campus conducting thesis research.
(6) The time spent satisfying each of the above requirements must be disjoint.

REQUIREMENTS FOR ENTRY

U.S. military officers, foreign military officers, U.S. government civilians and employees of foreign governments may apply. An applicant should have a Master's Degree in Software Engineering, Computer Science, or in a closely related field. Generally, an acceptable Ph.D. applicant must have above-average grades in a typical Master's degree program. The Ph.D. Program Committee will also take other evidence of research or academic ability into account in making a recommendation as to whether to admit an applicant.

DEGREE REQUIREMENTS

The student must complete the following steps, as detailed in the corresponding sections.

1. Satisfy the residency requirement
2. The following two requirements can be satisfied in any order, but must be completed before step 3.

    a) Form a Dissertation Committee
    b) Pass the Written Qualifying Examination

3. Advancement to Candidacy

    a) Dissertation proposal must be approved by the Dissertation Committee
    b) Pass the Oral Qualifying Examination

4. Pass the Final Oral Examination
5. Submit Approved Dissertation

† An equivalent distance learning residency requirement has been established by the Software Engineering Group as approved by the Academic Council on 26 June 1999.

APPLICATION PROCEDURE

Applicants must follow the standard procedures of their sponsoring organization in applying to a graduate education program, see Academic Council Policy Manual, Section 4.4. Applicants should have the sponsoring organization forward their letter of application to:

Director of Admissions (Code 01B3)
Naval Postgraduate School
589 Dyer Rd., Rm. 103C
Monterey, CA 93943-5100
Telephone (831) 656-3093, DSN 878-3093
FAX (831) 656-2891, DSN 878-2891

The application should include:

- certified transcripts of all courses taken at the university level, including both undergraduate and graduate courses
- results of a recent GRE general test if the prospective student is not currently at the Naval Postgraduate School
- scores on the TOEFL examination if the prospective student is a foreign student who is not a native speaker of English

If available, the following should be included:

- any material demonstrating ability to perform research, e.g., Master's theses and research papers
- reference letters only if the writer can report direct knowledge of the candidate's technical and research abilities

For sample application letter, refer to page 21.

The Ph.D. Program Committee evaluates each applicant to gauge the minimum amount of time the applicant will need to complete the program (normal time is three years). The Software Engineering Department may impose the condition that the applicant obtain authorization for at least four years to complete the degree. Admitted Ph.D. students may begin in any quarter, but it is recommended that the student start in the Fall Quarter (beginning in October) due to the requirements and timing of the Written Qualifying Examination.

Applicants are cautioned that admission to the Ph.D. program does not guarantee successful completion of the program. It is significantly more difficult to assess the qualifications of a student for a Ph.D. admission than for other degrees. This is because the research work required for the Ph.D. requires significant creativity and independence. Past experience suggests that not all of the students admitted will successfully complete the program. The purpose of the Written Qualifying Examination is to give students early warning if they are likely to have trouble in our Ph.D. program. For self-assessment, prospective applicants can obtain copies of previous examinations together with solutions by contacting the Software Engineering Ph.D. Program Committee at the Naval Postgraduate School.

SEQUENCE OF EVENTS LEADING TO A PH.D. IN SOFTWARE ENGINEERING

A general outline for a student's progression through the Ph.D. program follows:

1. The student applies for admission to the Software Engineering Ph.D. program through the Director of Admissions. Upon satisfactory review of the package by the Chair of the Software Engineering Ph.D. Committee and the Software Engineering Curricular Officer, the student is admitted to the program.

2. The Software Engineering Ph.D. committee nominates, for approval by the Academic Council, a dissertation committee, which henceforth bears the responsibility for the study program, and for general guidance in the research program. The departmental Ph.D. committee names a member of the dissertation committee to be dissertation supervisor, and certifies to the Academic Council that the individual so named is qualified under the guidelines of this Policy Manual. Until the dissertation committee is named, the Software Engineering Ph.D. committee has the responsibility to oversee the student's study program.

3. When the student's study program is essentially complete, the Software Engineering Ph.D. committee, or the faculty it designates on its behalf, administers a written qualifying examination.

4. When the student has successfully passed the written qualifying examination and the dissertation proposal has been submitted to the dissertation committee, the Software Engineering Ph.D. committee, or the faculty it designates on its behalf, administers an oral qualifying examination.

5. Upon successful completion of the study program, language, or computing requirements, passage of the written and oral qualifying examinations, and approval of a dissertation topic, the student becomes eligible for advancement to candidacy. The departmental Ph.D. committee then recommends that the Academic Council advance the student to candidacy for the doctorate.

6. When the candidate's investigations are complete and the dissertation has been submitted, the dissertation committee administers a final oral dissertation defense.

7. After the unanimous recommendation of the dissertation committee to approve the final version of the dissertation, the Academic Council makes the final decision to recommend a candidate for the award of the Ph.D. degree.

FORMING A DISSERTATION COMMITTEE

The student must form a Dissertation Committee to oversee his or her program as soon as possible after admission to the Ph.D. program. The Dissertation Committee is responsible for supervising the candidate's completion of the degree, including completion of a course of study, dissertation research, and production of the dissertation document. The Dissertation Committee also administers and determines the results of the Oral Qualifying Examination and the Final Dissertation Defense. Once a Dissertation Committee is formed, the Ph.D. Program Committee

nominates the Dissertation Committee for approval by the Academic Council. See page 22 for appointment of committee memorandum sample.

One of the members of the Committee from the Software Engineering Group must be designated as the Dissertation Supervisor, and will be the student's primary technical contact; the Dissertation Supervisor must be knowledgeable about the proposed research area for the dissertation and should have prior personal experience on Dissertation committees. The student must therefore choose the general research area for the dissertation prior to forming the Dissertation Committee.

Each Dissertation Committee must have a Chairman, who can be the same as the Dissertation Supervisor. The Dissertation Committee must contain at least three members of the Software Engineering faculty.

At the time of approval of the Dissertation Committee, the student must also formulate a Study Plan that includes a list of courses to be validated and a timetable of when he or she expects to pass the various milestones of his/her Ph.D. program. The Study Plan should be developed in consultation with the proposed Dissertation Supervisor. The Dissertation Committee members must agree that the Study Plan is acceptable when agreeing to serve on the Committee.

Ph.D. Committee, Dissertation Committee, and the Thesis Advisor
From the Academic Council Policy Manual (as of September 1999)

The departmental Ph.D. committee nominates a dissertation committee, to be approved by the Academic Council. One member of this committee is identified as the dissertation supervisor, and the departmental Ph.D. committee must certify to the Academic Council that the individual so named is qualified under the requirements of this Policy Manual. The student, in conjunction with the dissertation supervisor, identifies a dissertation topic, which must be approved by the dissertation committee. The departmental Ph.D. committee also designates the member of the dissertation committee who shall serve as dissertation committee chair, if that person is to be different from the dissertation supervisor.

Departmental Ph.D. Committee
From the Academic Council Policy Manual (as of September 1999)

Each Department offering a Ph.D. degree must have a standing Ph.D. committee. It shall be the responsibility of the departmental Ph.D. committee to oversee the Ph.D. program for the Department.

Among the duties of the departmental Ph.D. committee are the following:

1. Ensuring that the Ph.D. program designed for each student conforms to the minimum requirements imposed by the Academic Council in the Academic Council Policy Manual.

2. Determining any standing requirements, beyond those of the Academic Council, that must be fulfilled by all Ph.D. students in the Department.

3. Nominating, for approval by the Academic Council, the members of each Ph.D. student's dissertation committee, the dissertation supervisor, and certifying to the Council that the dissertation supervisor is qualified to hold that position.

4. Overseeing the administration of the written and oral qualifying examinations for each Ph.D. student, and insuring that the nature of those examinations conforms to the requirements of the Academic Council Policy Manual.

5. Requesting that the Academic Council advance a student to candidacy for the Ph.D. degree upon approval of a dissertation committee, dissertation topic, and successful completion of all screening, language, computing, and qualifying requirements and exams.

Prior to the naming of a dissertation committee and a dissertation supervisor, the departmental Ph.D. committee has the responsibility of supervising the student's program of study. After the naming of the dissertation committee and dissertation supervisor, the departmental Ph.D. committee retains the responsibility of overseeing the activities of dissertation supervisor and the dissertation committee, maintaining quality control of the departmental Ph.D. program.

The Dissertation Supervisor
Software Engineering Policy

The Software Engineering Ph.D. Committee oversees the formation of the Dissertation Committee. Faculty without any prior experience advising Ph.D. students in Software Engineering or a closely related field must petition the Ph.D. Committee for permission to supervise a Ph.D. student. The petition must be in writing and should include a curricula vita and any other material validating the faculty member's academic qualifications.

From the Academic Council Policy Manual (as of September 1999)

The dissertation supervisor has the responsibility to supervise the student's program of study in accordance with the requirements of the major Department and Academic Council.

The dissertation supervisor should have the following qualifications:

- a doctorate in his/her field of specialty;
- experience in thesis advising;
- activity and productivity in research, as evidenced by recent publications of his or her research in recognized journals, or a broad reputation as a productive researcher in his or her field of specialty;
- other evidence may be considered which is pertinent to demonstrating research activity or productivity.

The Dissertation Committee
From the Revised Academic Council Policy Manual (as of September 27, 2000)

The candidate's dissertation committee, once established, is responsible for supervising the candidate's completion of his/her degree, including completion of course of study, dissertation research, and production of the dissertation document. The dissertation committee is nominated by the departmental Ph.D. committee, and will consist of five or more members. Four of the committee members must be full-time NPS faculty. At least one of the NPS faculty members shall be from outside the department or interdisciplinary academic group that is granting the degree. One or more members of this committee may be from another university or appropriate institution. At least four members must have earned the doctorate and the committee may contain no more than two members who have not earned the doctorate. The departmental Ph.D. committee shall designate one or more members of the dissertation committee to be the dissertation supervisor.

WRITTEN QUALIFYING EXAMINATION

The purpose of the Written Qualifying Examination is to check each student's analytical abilities in the foundations of software engineering, their proposed research area, and solving problems in that area. These abilities are crucial for success in Ph.D. dissertation work.

Students typically complete the doctoral qualifying examination within one year of entering the Ph.D. program. There are two possible outcomes of the Written Qualifying Examination: Passed and Failed. If the student fails the first Written Qualifying Examination, the Software Engineering Ph.D. Program Committee may grant the privilege of a second examination opportunity. If granted, the second examination must be within 1 year of the first, and only two opportunities for passage are allowed (see Academic Council Policy Manual, Section 5.4.8).

Written Qualifying Examination questions will come from at least two subject areas determined by the Software Engineering Ph.D. Program Committee. There must be two faculty members, selected by the Software Engineering Ph.D. Program Committee, for each of the topics chosen for testing. To ensure breadth, a minimum of four faculty (at least two of whom are Software Engineering Group faculty) must be involved in the preparation and grading of the examination. The Written Qualifying Examination will be open notes/book.

From the Academic Policy Manual (as of September 1999)

The written qualifying examination is a comprehensive test of the student's basic knowledge of and skills in the major area. The exam is the responsibility of the departmental Ph.D. committee, and is administered by this committee or by faculty members whom the departmental Ph.D. committee designates to act on its behalf.

The written exam is administered after the student's program of study is essentially completed.

An up-to-date written statement of the format and procedures of the examination must be filed by each Department with the Academic Council.

Passage of the written qualifying examination requires a unanimous vote of the departmental Ph.D. committee, or those faculty members designated to act on its behalf.

If the student fails the first written qualifying examination, the departmental Ph.D. committee may grant a second examination opportunity to the student. If the privilege of re-examination is granted, the time period within which it must be accomplished is specified by the departmental Ph.D. committee, but it shall not exceed 12 months. Only two opportunities for passage are allowed.

Format of the Written Qualifying Examination

REQUIRED AREAS

Software Engineering Core – Software development process and techniques
- Software life cycle models, software engineering concepts and principles
- Specification and verification of software
  - Modeling, analysis, and assessment
- Design of large software systems
  - Architectures, patterns, and protocols
- Maintenance of large software systems
  - Reengineering, transformations, recovering specs and rationale

Advanced Software Engineering – Software automation
- Reducing coding efforts
  - Program generation, synthesis techniques, static checking
- Computer-aided prototyping
  - Models, languages, methods
- Software reuse
  - Search methods, library organization
- Software evolution
  - Models, automation methods, merging and slicing
- Domain specific
  - Real-time systems

CHOOSE ONE OF THE FOLLOWING

Computer Science
- Mathematical fundamentals
  - Using algebra and set theory for abstract data types
  - The role of logic in specification and verification
- Algorithms and data structures in software engineering
  - Recurrence equations
  - Algorithm design and analysis
  - Complexity and computability
- Compilation technology
  - Scanner/parser generators, attribute grammars
- Artificial Intelligence
- Security

Management and Economics

- Project planning and management
  - Cost estimation, team organization, scheduling, process improvement
- Quality Assurance
  - Risk assessment, reliability models, metrics, testing
- Software economics
  - Productivity, risk assessment, cost/benefit analysis, determining priorities
- Knowledge bases
  - Project databases, knowledge acquisition and representation
- Decision support
  - Models for group decision-making
- Fundamentals for modeling
  - Optimization – linear inequalities
  - Applied probability and statistics
  - Differential Equations
  - Simulation

Computer Systems

- Real-time systems
- Networks and distributed systems
- Hardware/software integration
- Interoperability of network based systems
- Computer graphics and interfaces
- Signal processing and embedded control systems

MINOR REQUIREMENTS

The Software Engineering Ph.D. Program does not have any minor requirements.

DISSERTATION PROPOSAL

A dissertation proposal should be submitted to the Dissertation Committee at least one week before the Oral Qualifying Examination. The purpose of the dissertation proposal is to provide the Dissertation Committee with the information needed to determine whether the proposed research topic is suitable for a Ph.D. dissertation. The proposal should describe the student's best current estimate of their research plan. The details in the proposal may be changed later as the research subject is understood in more detail.

DISSERTATION PROPOSAL

‹AUTHOR› ‹DATE›

I Proposed title of dissertation

II Goals and proposed new contribution.
- A. Introduce the problem and identify the specific goals.
- B. Significance of the problem and its potential impact.
- C. Proposed advances to the state-of-the art.

III Research strategy and proposed approach.
- A. Tactics for producing the proposed new contribution
- B. Methods to substantiate new contributions including proposed experiments, measurements or theoretical analysis.
- C. Expected delivery of products, if any.

IV Assessment of previous work for each relevant previous publication
- A. Summarize the results
- B. Point out weaknesses
- C. Explain how you will overcome the weakness or improve on previous results, if you plan to do so.

V Tentative chapter outline for dissertation.
Typically,

Chapter 1 Introduction

Chapter 2 Assessment of previous work

Middle chapters explain your main results, analysis of measurements, experimental results or theoretical analysis of performance, accuracy, or other measures of how good your contribution is.

Last chapter – conclusion and scope for future work.

VI Research plan and proposed schedule.

VII List of references.

ADVANCEMENT TO CANDIDACY

The following requirements must be satisfied before a student can be advanced to candidacy for the Ph.D. degree:

1. Approval of the dissertation subject
2. Passing the Written Qualifying Examination
3. Passing the Oral Qualifying Examination

Upon successful completion of the Oral Qualifying Examination, the student must petition the Academic Council for "advancement to candidacy for the doctorate." A memo to the Academic Council must be prepared stating that the requirements for advancement to candidacy have been successfully completed. The Academic Council notifies candidates of advancement to candidacy in writing.

Oral Qualifying Examination

Usually within one year and no more than two years after the successful completion of the Written Qualifying Examination, the student must successfully complete the Oral Qualifying Examination. Any courses in the study plan must be completed before the student can take the Oral Qualifying Examination. The student gets only two chances to pass the Oral Qualifying Examination (see Academic Policy Manual, Section 5.4.9, shown below).

The Oral Qualifying Examination is administered by the student's Dissertation Committee. The Dissertation Committee Chairman schedules the oral portion of the Qualifying Examination and the student submits a dissertation proposal to the Dissertation Committee. See page 23 for sample notification memorandum.

The Dissertation Committee asks any questions that it feels may help decide whether the student has sufficiently broad knowledge of the dissertation topic and sufficient analytic capability to begin full-time Ph.D. research. Time permitting, other faculty members in attendance may also ask questions of the student. The questions may be on any reasonable topic.

When the Dissertation Committee is satisfied that the student has been questioned thoroughly, the student leaves the room, the Dissertation Committee discusses concerns and votes on whether to pass the student; a unanimous vote is required. The final overall decision regarding pass or fail of the entire Qualifying Examination is made by the Dissertation Committee after the oral examination is completed.

The final result of the Written and Oral Qualifying Examinations must be reported to the Curricular Officer for Software Engineering Programs, the Associate Provost for Instruction, and to the Academic Council not later than two weeks after the scheduled date of the oral qualifying examination. Each member of the departmental Ph.D. committee, or those designated on its behalf, shall sign the report. Sample Pass/Fail memorandum is on page 24.

The Academic Council representative must submit a written report on the oral qualifying examination. The report is sent to the Academic Council to verify that the oral examination was conducted in accordance with the rules of the Academic Council.

From the Academic Council Policy Manual Section 5.4.9 (as of September 1999)

The oral qualifying examination may be scheduled only after successful passage of the written qualifying examination and fulfillment of any major field requirements, language requirements, and computer competency requirements.

The oral qualifying examination is the culmination of the course of study. The purpose of the oral qualifying examination is to test basic knowledge and creative ability and to demonstrate the student's capacity to use material from the course of study. The oral qualifying examination shall contain no prepared presentation, its format shall be exclusively question-and-answer.

Passage of the oral qualifying examination requires a unanimous vote of the examiners. All departmental Ph.D. committee members, or those designated on their behalf, must be present during all phases of the oral exam.

The extent of participation of all parties is determined by the departmental Ph.D. committee, or those designated to act on its behalf. The Academic Council representative must attend all phases of the oral examination, and shall report to the Academic Council that the examination was conducted in accordance with the rules of this Policy Manual. Attendance at the oral qualifying exam is delineated in Table 1.

If the student fails the first oral qualifying examination, the departmental Ph.D. committee may grant a second examination opportunity to the student. If the privilege of re-examination is granted, the time period within which it must be accomplished is specified by the departmental Ph.D. committee, but it shall not exceed 12 months. Only two opportunities for passage are allowed.

Table 1: Attendance and Voting Privileges for Oral Qualifying Examinations.

CATEGORY	ORAL QUALIFYING EXAMINATION
Departmental Ph.D. Committee members or those acting on its behalf	A, B, C, D
Academic Council Representative	A, B, C
Other faculty	A, B
Examinee	A
Students, Staff, and Visitors	A

Phase A: may attend Interrogation Phase
B: may attend Comment Phase
C: may attend Voting Phase
D: may Vote.

DISSERTATION GUIDELINES

From the Academic Council Policy Manual (as of September 1999)

Dissertation Topic

The distinct requirement of the doctorate is the successful completion of a scholarly investigation leading to the original and significant contribution to knowledge in the candidate's major area of study. The subject of the investigation must be approved by the dissertation committee, and must be submitted to the Council no later than the time of the request for advancement to candidacy.

A minimum of six months must elapse between successful completion of the oral qualifying examination and the defense of the dissertation.

Final Dissertation Guidelines

When the dissertation has been revised and clarified to the satisfaction of each member of the Dissertation Committee, each signs it. The Registrar checks the dissertation format, and finally the Degree Program Chair and Associate Provost for Instruction sign it.

FINAL ORAL EXAMINATION

At least six months after passing the Qualifying Examination, when the dissertation research is almost complete, and a draft of the dissertation has been finished and is available, the Final Oral Examination (also known as the dissertation defense) occurs. Sample dissertation defense memorandum is on page 26. This examination is administered by the Dissertation Committee and consists of the following:

1. An open (public) presentation of the findings of the research by the candidate, including response to questions from the audience within an allotted time period.
2. A question and comment phase open to all NPS Software Engineering faculty.
3. A closed session involving only the members of the student's Dissertation Committee and the Academic Council Representative. A unanimous vote by the Dissertation Committee is required for a successful outcome.

From the Academic Council Policy Manual (as of September 1999)

Dissertation Defense

When the dissertation research has been completed, the Ph.D. candidate prepares a draft of the dissertation and provides a copy to each member of the dissertation committee for approval. Upon the dissertation committee's unanimous acceptance of the draft as the basis for a dissertation defense, the dissertation committee chair notifies the departmental Ph.D. committee and provides it with a draft of the dissertation. The dissertation committee chair schedules the final dissertation defense. This examination must be scheduled later than one week after the submission of the draft of the dissertation to the departmental Ph.D. committee.

All members of the dissertation committee are required to attend the final defense, and the entire Academic Council is invited to attend. The Academic Council shall designate a representative, who must attend the dissertation defense.

In the final dissertation defense, the candidate presents the dissertation and is subject to such questions as the entire dissertation committee deem appropriate. The extent of participation of all parties is determined by the dissertation committee chair. Attendance at the final dissertation oral examination is delineated in Table 1.

Table 1: Attendance and Voting Privileges for Dissertation Defenses.

CATEGORY	**ORAL FINAL EXAM** (Dissertation Defense)
Dissertation Committee	A, B, C, D
Academic Council Representative	A, B, C
Other faculty	A, B
Examinee	A
Students, Staff, and Visitors	A

Phase A: may attend Interrogation Phase
B: may attend Comment Phase
C: may attend Voting Phase
D: may Vote.

The Academic Council representative must submit a written report on the dissertation defense (sample memorandum on page 27). The report is sent to the Academic Council to verify that the defense was conducted in accordance with the rules of the Academic Council.

Report of Completion of Dissertation and Successful Defense

The results of the final dissertation defense and completion of the dissertation document are reported to the Academic Council, the report bearing the signatures of all the members of the dissertation committee.

If the candidate is passed, the report shall also include: nomination of the successful candidate for the award of the degree, Doctor of Philosophy.

On-line Dissertation Submission Procedure

1. E-mail draft dissertation in Word or PDF for review by NPS Thesis Processor to thesisdraft@nps.navy.mil. Include your name in the subject line of the email message. Include your name, phone number, and email address in the text of the email message.

2. Dissertation will be returned by e-mail with comments in two days.

3. Incorporate change/recommendations made by the Thesis Processor.

4. Combine dissertation into one PDF file.

5. Provide final PDF version of dissertation to advisor.

6. Download and complete http://web.nps.navy.mil/~code09/thesis_release_form.doc.

7. Obtain necessary signatures on dissertation.

   This will involve sending your Thesis advisor/co-advisor a signed signature page, have your advisor sign the page and then forward it to the Software Engineering program staff.

   The Software Engineering staff will get signatures from the Software Engineering Program Chair, scan the signature page into a PDF document and email the document back to the student.

8. Insert the signed signature page in dissertation to replace unsigned page in the PDF file.

9. Complete Special Abstract and Email Distribution List http://web.nps.navy.mil/~code09/thesis_release_form.doc.

10. E-mail final version of the dissertation in one PDF file along with the Special Abstract Distribution List to Thesis Processor that reviewed your initial draft.

11. Submit your final dissertation to the Thesis Processor that reviewed your initial draft.

    Include your name in the subject line of the email message. Include your name, phone number, email address, and the Thesis Processor that reviewed your initial draft in the text of the email message.

12. Obtain necessary approvals/signatures on Thesis Release form http://web.nps.navy.mil/~code09/thesis_release_form.doc.

    This will involve sending your dissertation advisor/co-advisor a signed Release Form, have your advisor sign it and then forward it to the Software Engineering program staff.

    The Software Engineering staff will get signatures form the Software Engineering Program Chair and the curriculum officer and forward it to the Thesis Processor.

    (Refer to http://web.nps.navy.mil/~code09/reseach1.html for templates and details.)

PROCEDURES FOR GRADUATING PH.D. STUDENTS

By Week 1:
Student intending to graduate this quarter provides: Draft dissertation to their advisor (for content) and thesis processor for format check (Ms. Elaine Christian, 831-656-2762, thesisdraft@nps.navy.mil)
- Send the following information to the Ph.D. Committee Secretary at sephd@nps.navy.mil
  Full name (how name should appear on diploma)
  Mailing address for the diploma
  Will student be attending graduation at NPS?

By Week 3:
- Student gets feedback from advisor and thesis processor and revises draft accordingly
- The Ph.D. Committee Secretary will provide graduating student's information to Ms. Jean Brennan (Code 32 Curricular Office)

By Week 4:
Student provides revised draft to all committee members

By Week 6:
- Committee members provide feedback to student whether dissertation is ready for final defense
- If ready, student schedules final defense for week 8
- If not ready, student withdraws from the graduation list

By Week 8:
- Conduct the final defense
(Note: A student who fails the final defense can only retake the exam once, if the Academic Council recommends a re-exam, it must be taken within 12 months, and at a date prescribed by the committee members)
- Withdrawal deadline for graduation
- While student is at NPS, contact the following:

    Ms. Sharee Kelso, Academic Council – to complete National Science Foundation Survey (831-656-2591, skelso@nps.navy.mil)

    Ms. Sonya Solomon, Graduation Coordinator – for graduation program information (831-656-2075, ssolomon@nps.navy.mil)

    Ms. Pat Paulson, Provost's Secretary – for Cap & Gown and Dissertation Title (831-656-2371, ppaulson@nps.navy.mil)

-Student prepares final version of dissertation responding to issues raised by the committee in the final defense.

By Week 11:
- Graduating student's final week to obtain all necessary signatures for the completed dissertation, dissertation release and security form.

Week 12:
- Graduating students must be present on Wednesday of the graduation week to attend the commencement rehearsal
- Graduation ceremony is usually held on Thursday.

FACULTY OF SOFTWARE ENGINEERING AT NAVAL POSTGRADUATE SCHOOL

Auguston, Mikhail, Visiting Associate Prof., Ph.D., Glushkov Institute of Cybernetics, USSR, 1983.
Programming language design and implementation, Software testing and debugging automation, Visual programming.

Berzins, Valdis, Prof., Ph.D., Massachusetts Institute of Technology, 1979.
Automated decision support for developing and assessing software requirements, Software merging for computer-aided maintenance, Automatic program generation from problem descriptions.

Bhattacharya, Swapan, Senior Research Associate, NRC, Ph.D., University of Calcutta, India, 1991.
Modeling of distributed systems; Design of large semi-structured information systems; Reliability of interconnection networks.

Bryant, Barrett R., Associate Prof., Ph.D., Northwestern University, 1983.
Formal specification of software systems, object-oriented distributed computing, object-oriented software technology, programming languages and compiler design.

Butler, Jon, Prof., Ph.D., Ohio State University, 1973. IEEE Fellow.
System Design, Multiple-Valued Logic, Number Systems, and Combinatorial Mathematics.

Dolk, Daniel, Prof., Ph.D., University of Arizona, 1982.
Model management, Enterprise modeling, Geographic Information Systems (GIS) Evolutionary computing.

Ge, Jun, Research Associate, NRC, Ph.D., Tsinghua University, China, 1998.
Control theory and application, Simulation, System modeling.

Hamilton, John A., Jr., Visiting Associate Prof., Ph.D., Texas A&M University, 1996.
System interoperability, Distributed simulation, Software requirement analysis, System architecture.

Jones, Carl, Prof., Ph.D., Claremont Graduate School, 1965.
Systems engineering and management of information systems, Decision support systems, Military information systems, C4ISR.

Kamel, Magdi, Associate Prof., Ph.D., University of Pennsylvania, 1988.
Database Management Systems, Expert Systems, Application Development Methodologies, Client/Server Computing.

Kang, Wei, Assistant Prof., Ph.D., University of California - Davis, 1991.
Dynamical systems, Control theory and applications.

Kiselyov, Oleg, Resident Research Associate, Ph.D., University of North Texas, 1993. IEEE Senior Member.
Functional programming languages, XML, Distributed file systems, Image processing and compression, Scientific computing and numerical math.

Lewis, Ted, Prof., Ph.D., Washington State University, 1971.
Distributed computing, parallel programming, and object-oriented framework design. Client/server rapid application development software and high-performance computing.

Lundy, Bert, Associate Prof., Ph.D., Georgia Tech., 1988.
Communications networks, including high speed network protocols, formal specification and analysis of protocols, and in applications of high-speed networks.

Luqi, Prof., Ph.D., University of Minnesota, 1986. IEEE Fellow.
Risk reduction for real-time systems via computer-aided rapid prototyping. Elicitation and refinement of requirements based on prototypes. Legacy system re-engineering.

Michael, Bret, Associate Prof., Ph.D., George Mason University, 1993.
Component-base architectures for distributed systems. Adaptable intelligent components for specifying and enforcing policy in distributed systems. Information-theoretic modeling of trust and policy about trust. Computer-based intelligent assistance for generating policy-governed information systems.

Nissen, Mark, Assistant Prof., Ph.D., University of Southern California, 1996.
Application of artificial intelligence to the innovation of acquisition processes.

Osmundson, John, Associate Prof., Ph.D., University of Maryland, 1970.
Analysis, modeling, and simulation of distributed, time-critical information systems. Application of systems engineering, and computer modeling and simulation expertise to the development of system architectures, performance models, and system trades of time-critical systems.

Otani, Thomas, Associate Prof., Ph.D., University of California – San Diego, 1983.
Database, Visual Query Language, Web Database Connectivity, ODBMS, Robot Simulator, OOP Education.

Rowe, Neil, Associate Prof., Ph.D., Stanford University, 1983.
A broad range of topics in applied artificial intelligence.

Schneidewind, Norman F., Prof., D.B.A., University of Southern California, 1966. IEEE Fellow.
Design and performance evaluation of computer networks and distributed systems. Development of software reliability models. Development of and evaluation of software quality metrics.

Sengupta, Kishore, Associate Prof., Ph.D., Case Western Reserve University, 1990.
Decision support and decision behavior in dynamic environments, Multimedia and intelligent tutoring systems, Computer-supported collaborative work.

Shing, Man-Tak, Associate Prof., Ph.D., University of California – San Diego, 1981.
Real-Time Embedded Systems: computer-aided prototyping tools, software architectures, and efficient scheduling algorithms.

Volpano, Dennis, Associate Prof., Ph.D., Oregon Graduate Institute, 1986.
Provably-secure programming languages and their type systems, to design a provably-secure programming language and to identify the appropriate security properties.

Xie, Goeffrey, Assistant Prof., Ph.D., University of Texas - Austin, 1996.
Real-time networking and multimedia systems.

Zhang, Du, Prof., Ph.D., University of Illinois – Chicago, 1987. IEEE Senior Member.
Knowledge-based systems and expert systems, intelligent agent systems for internet/web applications, machine learning and data mining, application of formal methods in software system development, deductive database systems, and Petri net modeling.

[Click **here** and type return address]

[Enter date here]

Director of Admissions (Code 01B3)
Naval Postgraduate School
589 Dyer Rd., Rm. 103C
Monterey, CA 93943-5100

To Director of Admissions:

Please accept my application to the Ph.D. Program in Software Engineering at the Naval Postgraduate School. I have enclosed the following application materials:

Certified transcripts from [Enter Academic Institution here]

Certified transcripts from [Enter Academic Institution here]

Results from a recent GRE general test

Master's Thesis entitled [Enter thesis title here]

Research paper entitled [Enter paper title here]

Reference letter from [Enter name of reference here]

Thank you for your consideration.

Sincerely,

[Click **here** and type your name]
[Click **here** and type job title]

NAVAL POSTGRADUATE SCHOOL
Monterey, California 93943

‹DATE›

MEMORANDUM

From: Chair, Software Engineering Ph.D. Program Committee
To: Academic Council

Subj: Appointment of Dissertation Committee

1. ‹NAME› was accepted into the Software Engineering Ph.D. program on ‹DATE›.

2. The Software Engineering Ph.D. Program Committee requests the following dissertation committee be formed to guide their research.

   ‹COMMITTEE MEMBERS and their FIELDS OF EXPERTISE›

3. ‹NAME› will conduct his research in the area of ‹AREA OF RESEARCH›.

4. To allow ‹NAME› to more effectively organize a program of study, action on this request is requested at the earliest convenience of the Council.

_____
Valdis Berzins
Chair, Software Engineering Ph.D. Program Committee

Copy to:
‹Ph.D. Candidate›
‹Committee Members›

NAVAL POSTGRADUATE SCHOOL
Monterey, California 93943

‹DATE›

MEMORANDUM

From: ‹NAME› (Chair, Dissertation Committee for ‹NAME›)
Code ‹CODE›, Software Engineering
Naval Postgraduate School
Monterey, CA 93943

To: Academic Council
Code O1B, Associate Provost for Instruction
Naval Postgraduate School
Monterey, CA 93943

Subj: Ph.D. Oral Qualifying Examination

1. In accordance with Academic Council Policy, the purpose of this memorandum is to inform the Academic Council of the upcoming Ph.D. Oral Qualifying Examination for my Ph.D. Student, ‹NAME›.

2. I have arranged for ‹NAME› Ph.D. Oral Qualifying Examination to be held at ‹DATE/TIME› in ‹LOCATION›.

3. It is requested that the Academic Council designate a representative to attend.

4. If you have any question, please give me a call at ‹PHONE›.

_____
‹Name›
‹Title›

Copy to:
Chair, Ph.D. Program Committee ‹Name›
‹Committee Members›
‹Ph.D. Candidate›

NAVAL POSTGRADUATE SCHOOL
Monterey, California 93943

‹DATE›

MEMORANDUM

From: Chair, Dissertation Committee
To: Academic Council, Code O1B

Subj: Ph.D. Oral Qualifying Examination

1. Results of Dissertation Committee's Ph.D. Oral Qualifying Examination of ‹S_NAME›.

‹P_Name› (Dissertation Supervisor): Pass/Fail_____

‹Committee Member›: Pass/Fail_____

‹Committee Member›: Pass/Fail_____

‹Committee Member›: Pass/Fail_____

‹Committee Member›: Pass/Fail_____

2. As Chairman of the Ph.D. Dissertation Committee, I am hereby informing the Academic Council of the Dissertation Committee's decision to pass ( )/fail ( ) ‹S_NAME› on the Ph.D. Oral Qualifying Examination.

_____
Chair, Dissertation Committee

Copy to:
‹P_Name› Chairman, Dissertation Committee
‹Ph.D. Candidate›

NAVAL POSTGRADUATE SCHOOL
Monterey, California 93943

‹DATE›

MEMORANDUM

From: Chair, Software Engineering Ph.D. Program Committee
To: Academic Council, Code O1B

Subj: Advancement to Candidacy for ‹S_Name›

1. The student has ( )/has not ( ) completed all the other necessary requirements of Ph.D. Candidacy as outlined by the Academic Council and Department of Software Engineering. I consequently do ( )/do not ( ) recommend ‹S_NAME› to be advanced to candidacy at this time.

_____
Chair, S.E. Ph.D. Program Committee

Copy to:
‹P_Name› Chairman, Dissertation Committee
‹Ph.D. Candidate›

NAVAL POSTGRADUATE SCHOOL
Monterey, California 93943

‹DATE›

MEMORANDUM

From: Chairman, Doctoral Committee for ‹NAME›
To: Academic Council

Subj: Dissertation Defense for ‹NAME›

1. ‹NAME› will appear before the Dissertation Committee on ‹DATE› at ‹TIME› in ‹LOCATION› to defend their doctoral dissertation entitled "‹TITLE›".

2. It is requested that the Academic Council designate a representative to attend.

_____
‹Name›
Chairman, Doctoral Committee

Copy to:
‹Ph.D. Candidate›
Associate Provost for Instruction (Code 01B)
‹Committee Members›
Software Engineering Faculty

NAVAL POSTGRADUATE SCHOOL
Monterey, California 93943

‹DATE›

MEMORANDUM

From: Chair, Software Engineering Ph.D. Committee
To: Academic Council, Code O1B

Subj: Results of Dissertation Defense

1. ‹NAME› has successfully completed all the requirements for a Ph.D. in Software Engineering. His dissertation entitled: "‹TITLE›" was successfully defended before this committee on ‹DATE OF DEFENSE›.

2. This committee nominates ‹NAME› for the degree, Doctor of Philosophy in Software Engineering.

_____	_____
Valdis Berzins	‹Name›
Prof.	‹Title›
Chair, Software Engineering Ph.D. Committee	Chair, Dissertation Committee
_____	_____
‹Committee Member›	‹Committee Member›
‹Title›	‹Title›
_____	_____
‹Committee Member›	‹Committee Member›
‹Title›	‹Title›

Copy to:
Dissertation Committee
Chair, Software Engineering
Chair, Ph.D. Committee

POTENTIAL PH.D. DISSERTATION TOPICS

(1) The U.S. Army Crusader Project

(2) Drive-by-Wire Technology

(3) The Bradley Software Architecture and Acquisition Project (Army Acquisition Corp)

(4) Vehicle Control Software Standards, Requirements Specification

(5) Vehicle Domain-Specific Reusable Components

(6) Software Architecture for Autonomous Vehicles

(7) Software Automated Control Software Generator

(8) Tank Traffic Controls Systems

(9) Aegis Interoperability and CIDE

(10) Software Technology for Battlefield Integration

(11) Architecture for Semi-Automated Software Reliability Prediction and Error Correction Process

(12) Virtual Environment for Systematic Vehicle Software Demonstration

(13) Light-Weight Inferencing Technology

(14) Architecture for Semi-Automated Risk Assessment and Error Correction Process

(15) Wireless Control Software

(16) Distributed Software Design/Development Environment

(17) Architecture for Component-Based System Integration

(18) Agent-Based Network Maximization

(19) Software Evolution Control and Support